



## Section 2

### ISS Planning Overview

**Kevin DePaola**

**DO4/Flight Planning Branch**

**NASA JSC**

**Station Operations Planning Group**



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# ISS Planning Centers





## Key Planning Terms



- **Planning Period** – approximately one calendar year; convenient length of time to consider Traffic and Manifest options. Each one begins with the nearest crew rotation to the beginning of the calendar year
- **Increment** – Period that one crew stays on ISS. Also referred to as an **Expedition**.
- **Stage** – Period of operation between Shuttle docking.
- **Activity** – Basic “unit” used in Planning. Amount of time required by the crew, ground, or automated “Operator” to execute a given procedure. Rough guideline; minimum one activity per procedure. Some large procedures require a **Sequence** of activities.
- **Constraint** – A constraint is a limitation placed on operations by the ISS, medical community, transportation vehicle design, system operations, trajectory, etc . Constraints set boundaries for activity scheduling, resource allocation, and the use of hardware or software. In planning, constraints can be modeled as activities, incorporated within activity definitions, or taken into account during/throughout the planning and scheduling process.
- **Groundrule** – A ground rule is an assumption or guideline that provides direction for an approved or preferred method of performing a function or operation. For planning, Groundrules provide standard guidelines to be considered for activity scheduling, resource allocation, timeline and planning product development, and product replanning.
- **Sequence** – A sequence consists of one or more activities to be performed in a meaningful order of execution. Sequences describe the temporal relationships between activities. Activity sequences are developed by temporally relating two or more activities.



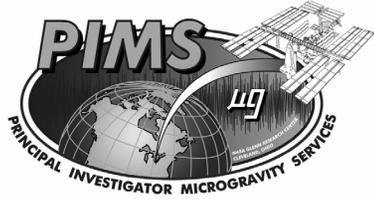
## ISS Tactical Planning



### Tactical Planning (I-2.5 years to 6 months)

JSC/OC, JSC/OZ, MSFC/POIC

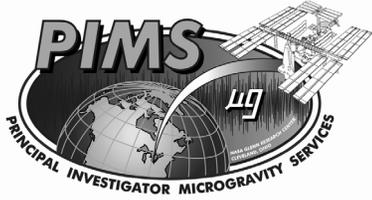
- **Payload Interface Agreement (PIA) –**
  - Documents agreements made between ISS Program and the Payload Developers (PD) concerning ISS resources, capabilities, and services.
  - Draft submitted 24 months prior to Increment (I-24); approved I-22 months
- **Payload Interface Agreement (PIA) Addenda –**
  - Document the payload's Increment-specific requirements
  - Draft submitted I-21 months, approved I-18 months
- **Payload Data Set –**
  - define, on an increment- and flight-specific basis, the engineering, integration, and operations details contained in the payload's PIA and PIA Addenda.
  - Includes all technical data required for the Training, Ground Data Services, P/L Operations, KSC Support & Technical, P/L Planning, P/L Procedures, and P/L Configuration data sets



## ISS Tactical Planning



- **IDRD Annex 5: Payload Tactical Plan –**
  - Provides ISS Payload Program office direction to the NASA Research Program Offices and Payload Field Centers.
  - Documents research objectives and requirements
  - Baselined at I-20 months; updated at I-12, 6, and 4 months.
  - Built from data provided in PIA and PIA Addenda
- **Increment Design and Requirements Document (IDRD) –**
  - Defines the requirements for Increments within a “Planning Period” inclusive of any docked operations with the Shuttle, Progress, Soyuz, Automated Transfer Vehicle (ATV), H-II Transfer Vehicle (HTV) etc.
  - Provides for the assignment of flight dates, resources, & accommodations
  - Baselined I-16 months; updates every several months until ~ I-1 month.
  - After this point; any requirement changes go into the Current Stage Requirements Document (CSRD)
  - Includes Manifest Summaries
  - Built from data provided in PIA and PIA Addenda



## ISS Manifest Process

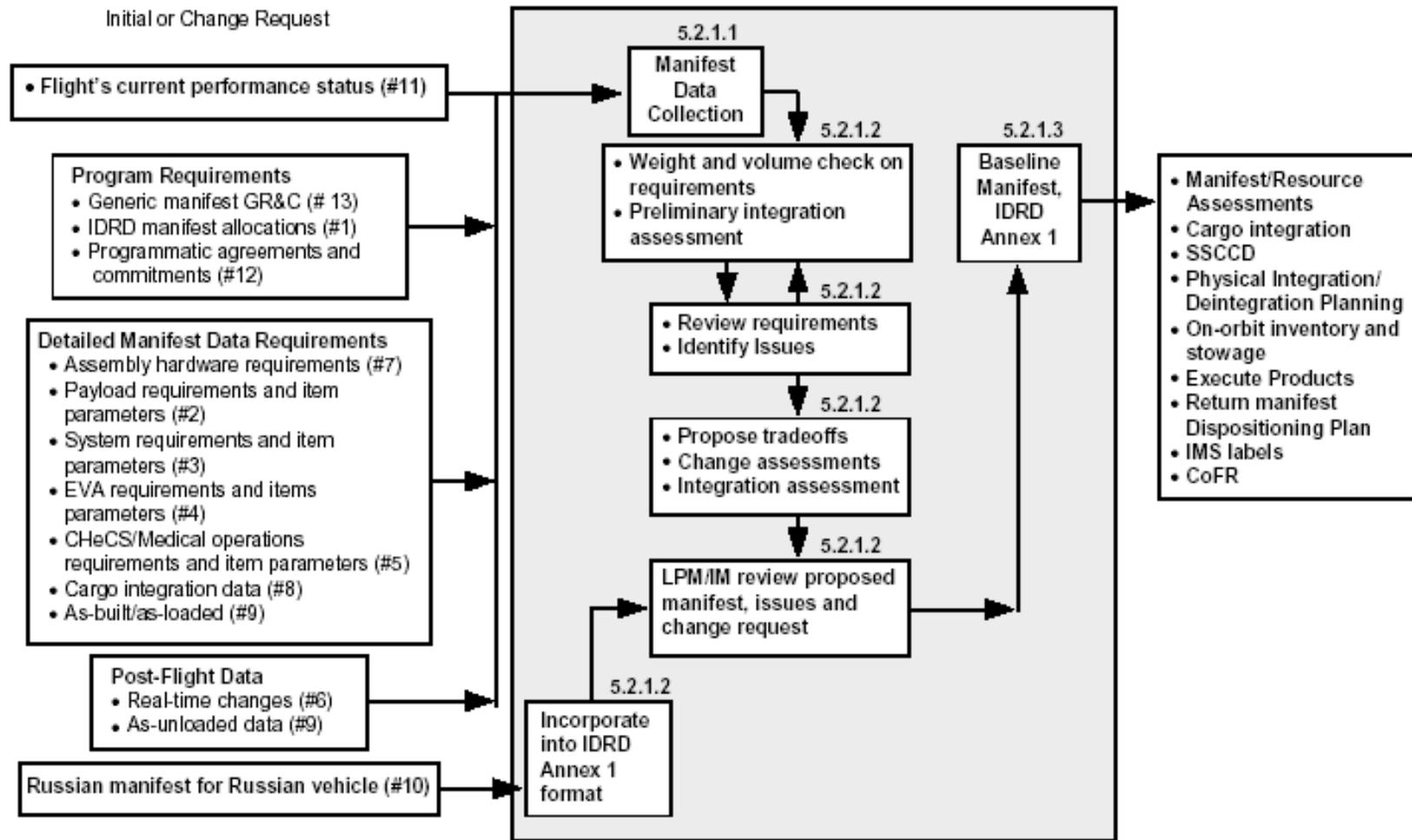


- **IDRD Annex 1 – Station Manifest Development**

- Program document that consists of the integrated manifest list for assembly, utilization, logistics items that launch or return on the Shuttle, Russian vehicles, ATV, and HTV.
- Includes the detailed list for system, assembly, utilization, resupply, reservice, and loose items.
- Submittal of Manifest Requests at Launch-15 months
- Baselined at L-12 months, Updates at L-9,6,3,1.5 months and L- 2 weeks
- Weekly updates within L-2 weeks as required
- Controlled by the Manifest Working Group
- Built from data in the IDRD & Payload Data Set

# ISS Manifest Generic Process

**INPUTS** → **ANALYSES** → **PRODUCTS** → **USE**



521-1.doc



## Increment Pre-Increment Planning



### Pre-Increment Planning (I-12 to 1 month)

MSFC/POIC, JSC/DO4

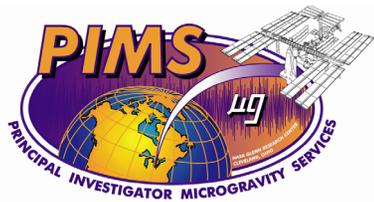
- **Payload Planning Data Set –**
  - Subset of Payload Data Set described in detail in Payload Data Sets Blank Book SSP 52000-PDS Revision C August 2001
  - Due date for promotion into interim User Requirements Collection (iURC) at I-12 months and updated at I-6 months
  
- **Increment Overview Plan –**
  - Released initially at 1 year prior to increment start
  - Updated for significant meetings in the pre-increment timeframe
  - Red/Yellow/Green identified for each week of the Increment
    - Based on educated guess on crew workload from the preliminary layout of significant operations identified in the IDR (Vehicle Traffic, EVAs, etc)
    - Red 10 crew hours for utilization
    - Yellow 15 crew hours for utilization
    - Green 25 crew hours for utilization



## Increment Planning: Pre-Increment



- **On-Orbit Summary (OOS) –**
  - Identifies planned operations to the day
  - Basic Payload OOS released at I-6 months
  - Final ISS Integrated OOS development starts at I-6 months and the approval at I-1 month
- **Increment Specific Groundrules and Constraints (Gr&C) –**
  - Documents System and Payload Gr&Cs specific to the operations during the Increment
  - Basic Payload Gr&Cs released at I-6 months
  - Final ISS Integrated Gr&C development starts at I-6 months and the approval at I-1 month



# Increment Overview



### Expedition 8 Crew

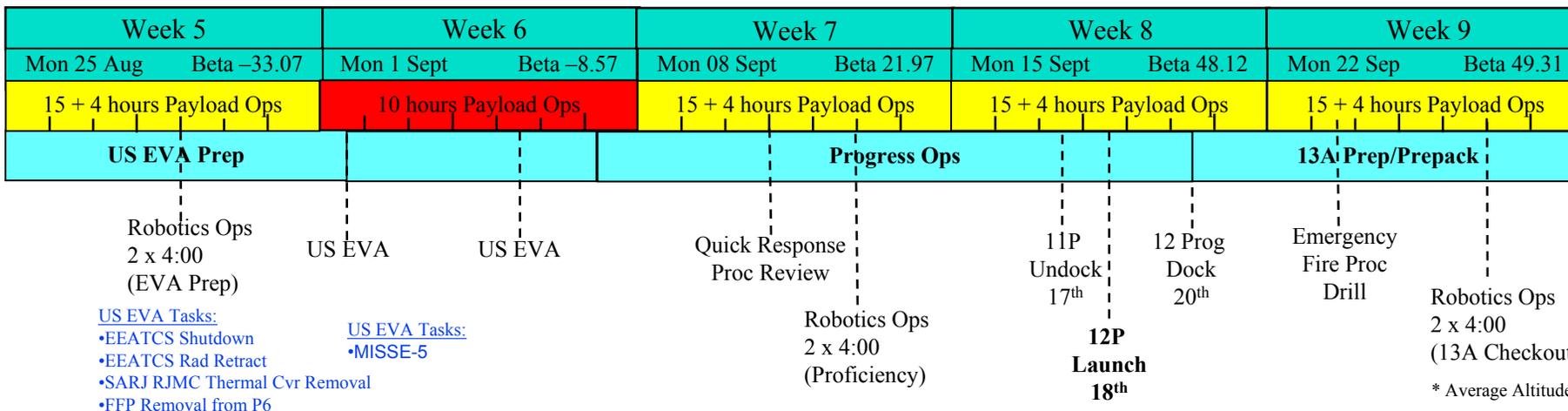
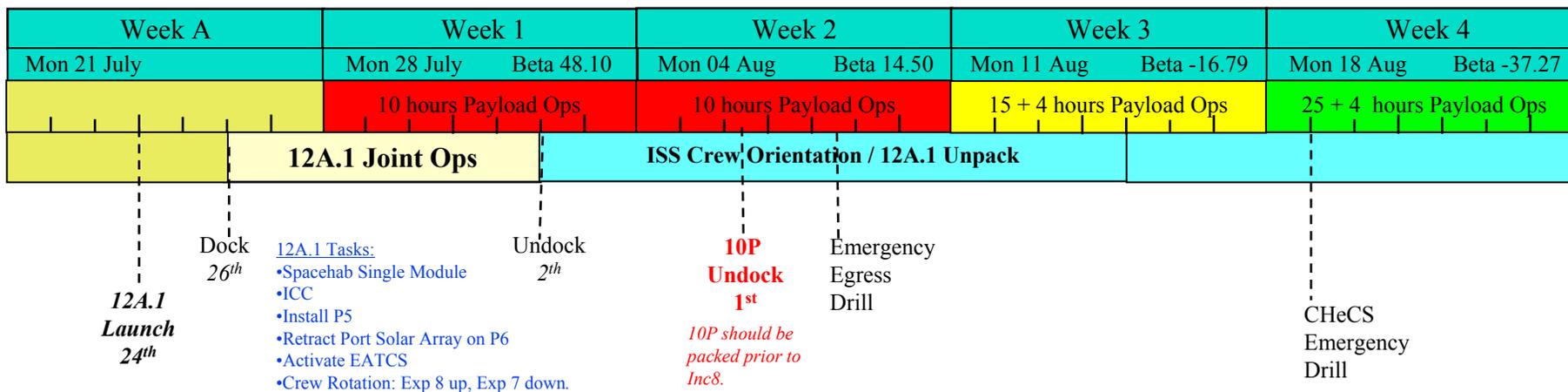
ISS CDR: NASA/ M. Foale  
 ISS PLT: RSA/Tokarev  
 FE-1: NASA/McArthur

### Increment 8 Flight Directors

Increment Lead - Norm Knight  
 12A.1 Lead - J. Curry  
 13A Lead - P. Hill  
 13A.1 Lead - J. Montalbano  
 15A Lead - S. Davis

### Increment 8 Planners

Increment: Julie Dunning/Steve Gibson  
 12A.1 Lead: Joe Kitchen  
 13A Lead: Linda Lipsky  
 13A.1 Lead: Kevin DePaola  
 15A Lead: Lisa Holmesly



US EVA Tasks:  
 •EEATCS Shutdown  
 •EEATCS Rad Retract  
 •SARJ RJMC Thermal Cvr Removal  
 •FFP Removal from P6

US EVA Tasks:  
 •MISSE-5

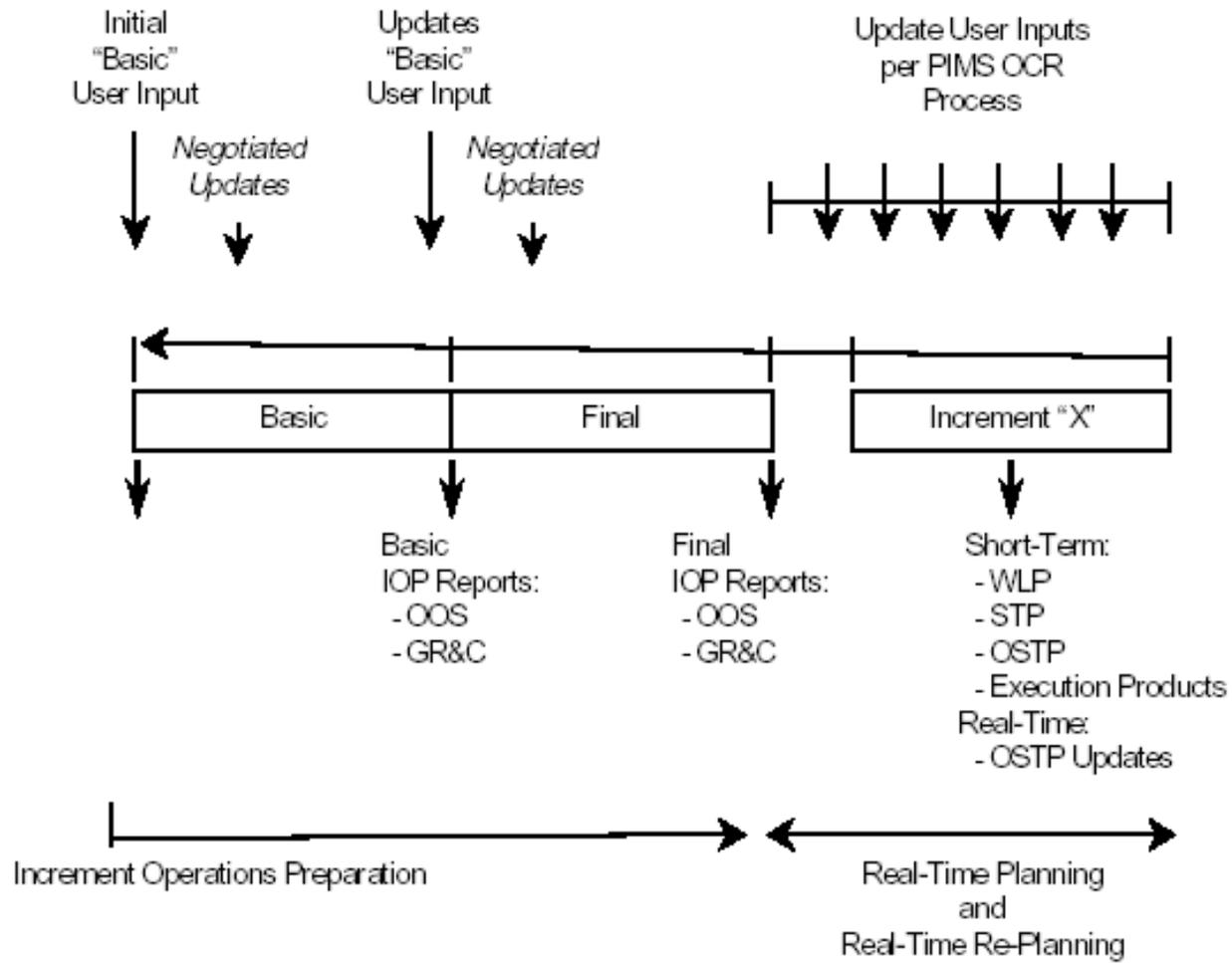
March 4<sup>th</sup>, 2003

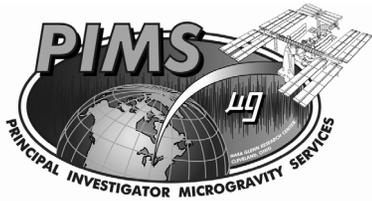
<https://ops1.jsc.nasa.gov/data/plans.asp>

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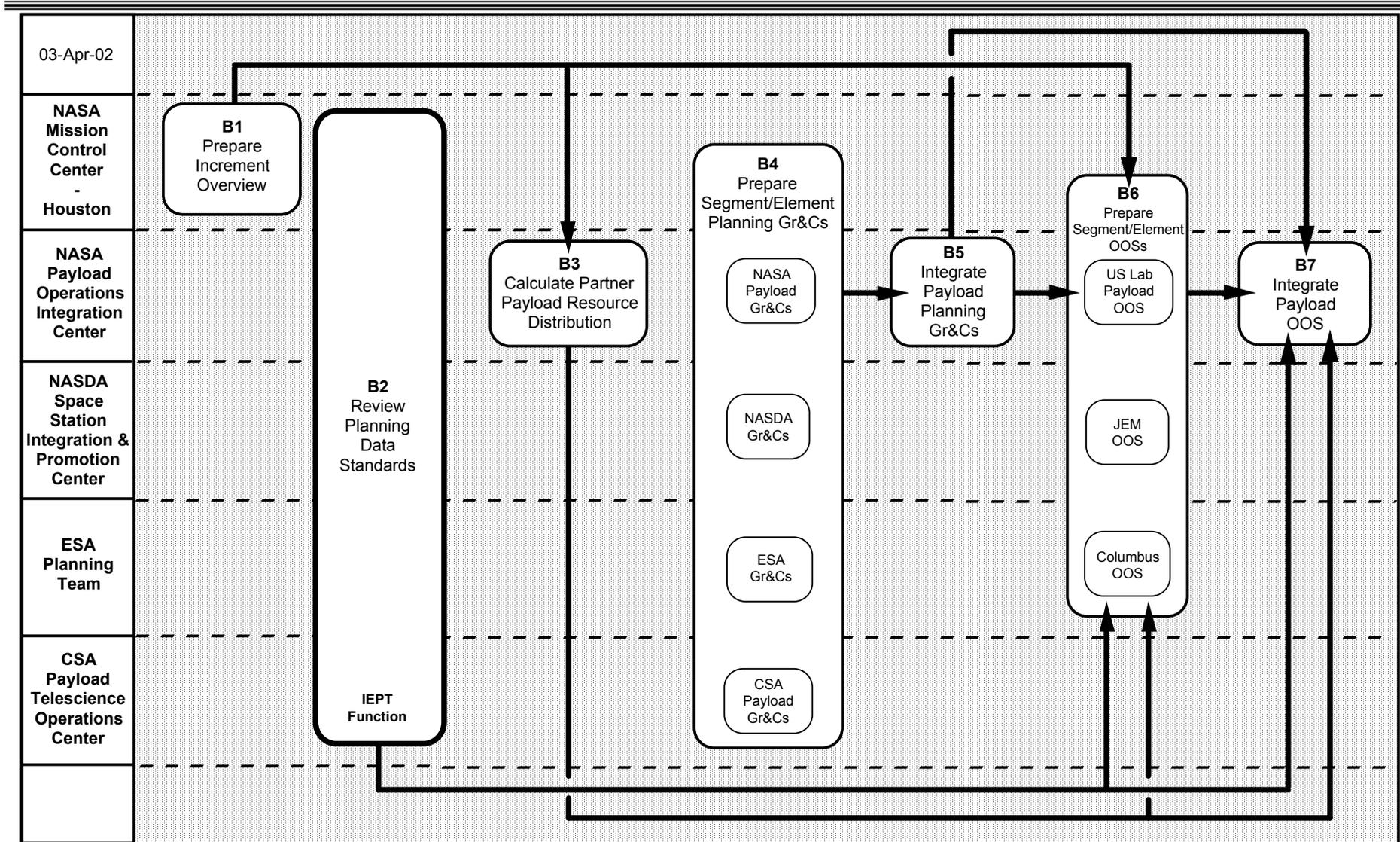


# Payload Planning Template



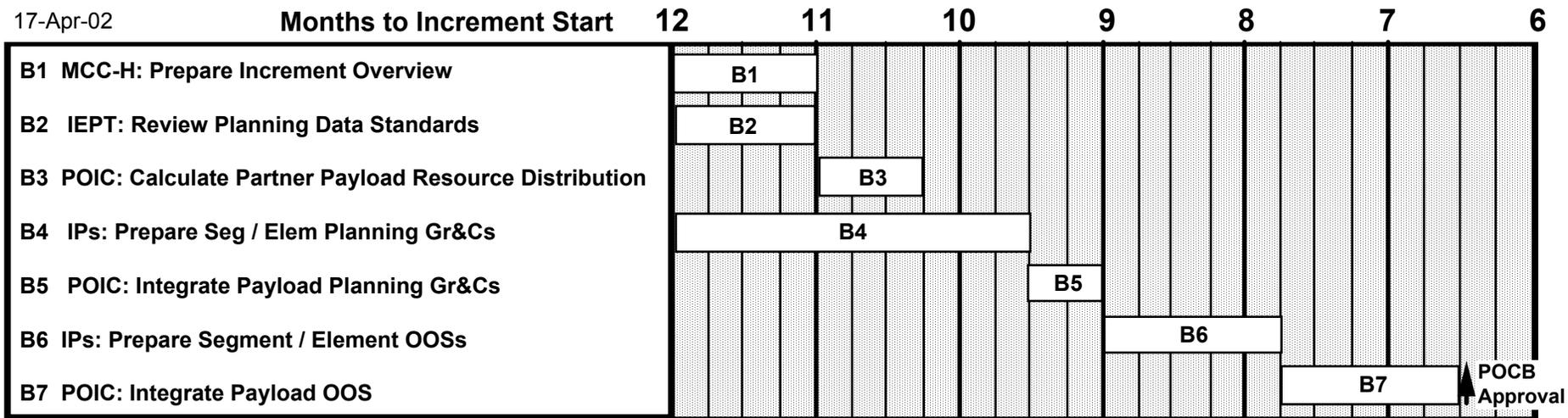


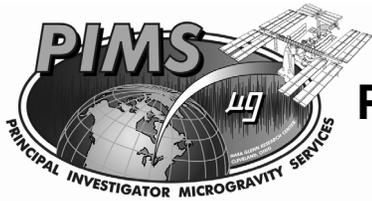
# Pre-Increment Execute Planning Process Flow – Basic Cycle



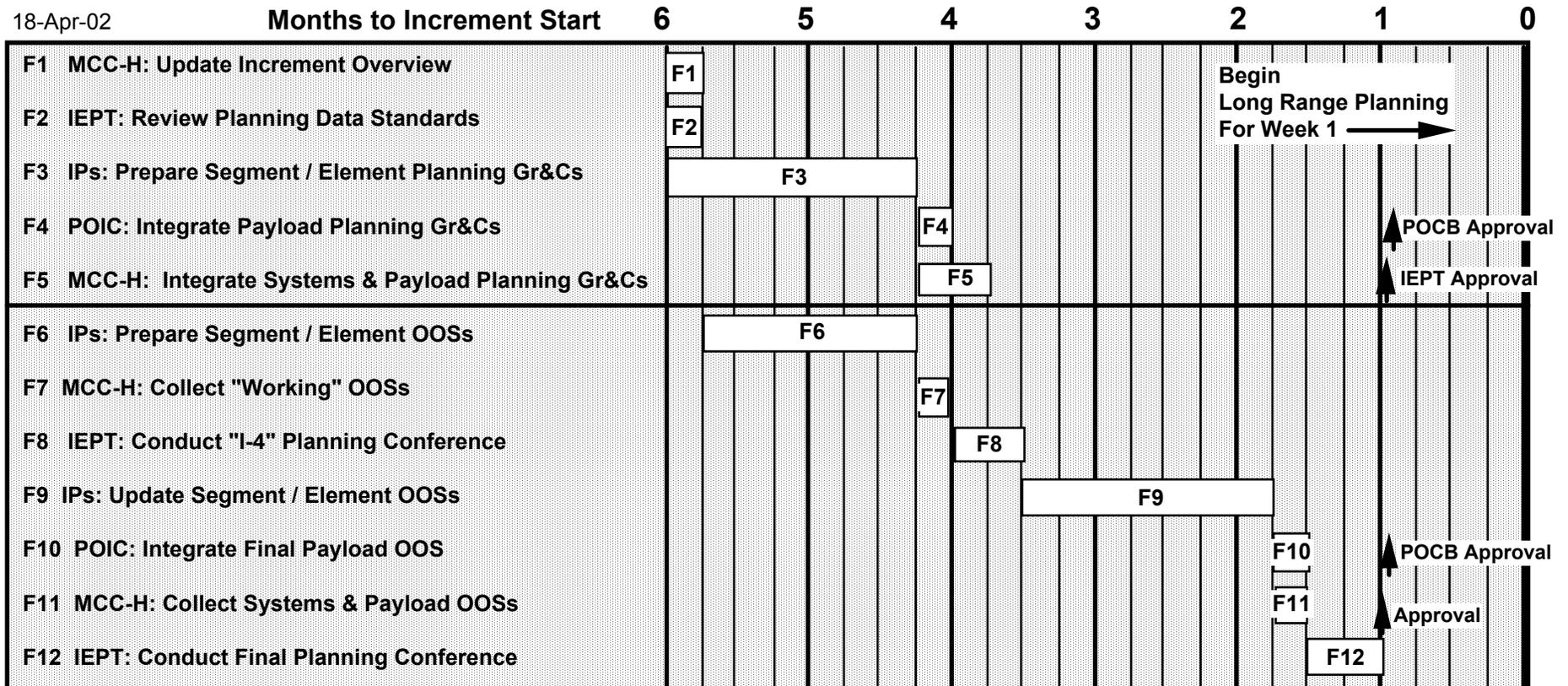


# Pre-Increment Execute Planning Process Template - Basic Cycle





# Pre-Increment Execute Planning Process Template - Final Cycle



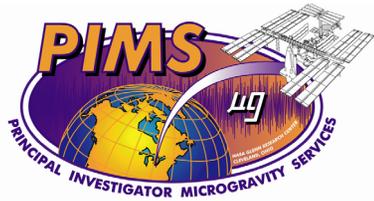


## Increment Planning: Execution



- **Short Term Planning**

- Planning requirements updates from the Payload Developers/Payload Investigators are submitted via Payload Information Management System (PIMS) Operations Change Request (OCR).
- Production of the Weekly Look-ahead Plan (WLP) results in a daily list of integrated ISS System and Utilization activities
  - Focus is on the activities involving the crew
  - Additional “Multi-Segment” operations are also noted
  - Initial development begins ~Execute – 3 Weeks (E-3 weeks)
  - Planning Centers provide input to MCC-H no later than E-2 Weeks
  - An approved WLP is available E-10 days
- Short Term Plans (STP) are developed based on the approved WLP and any Planning Product Change Requests (PPCR)
  - PIMS OCRs are transferred to Planning Product Change Requests (PPCR) by MSFC POIC
  - Planning Centers provide input to MCC-H no later than E-7 days
  - Draft released at EOB Houston E-7 days
  - Reviewed by Control Centers during E-6 day
  - Final delivered at EOB E-6 days



# Typical STP Crew Page

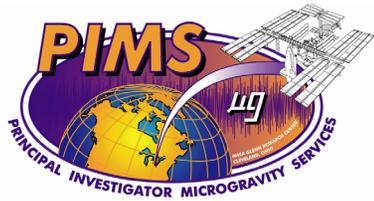


02/15/03 12:23:41

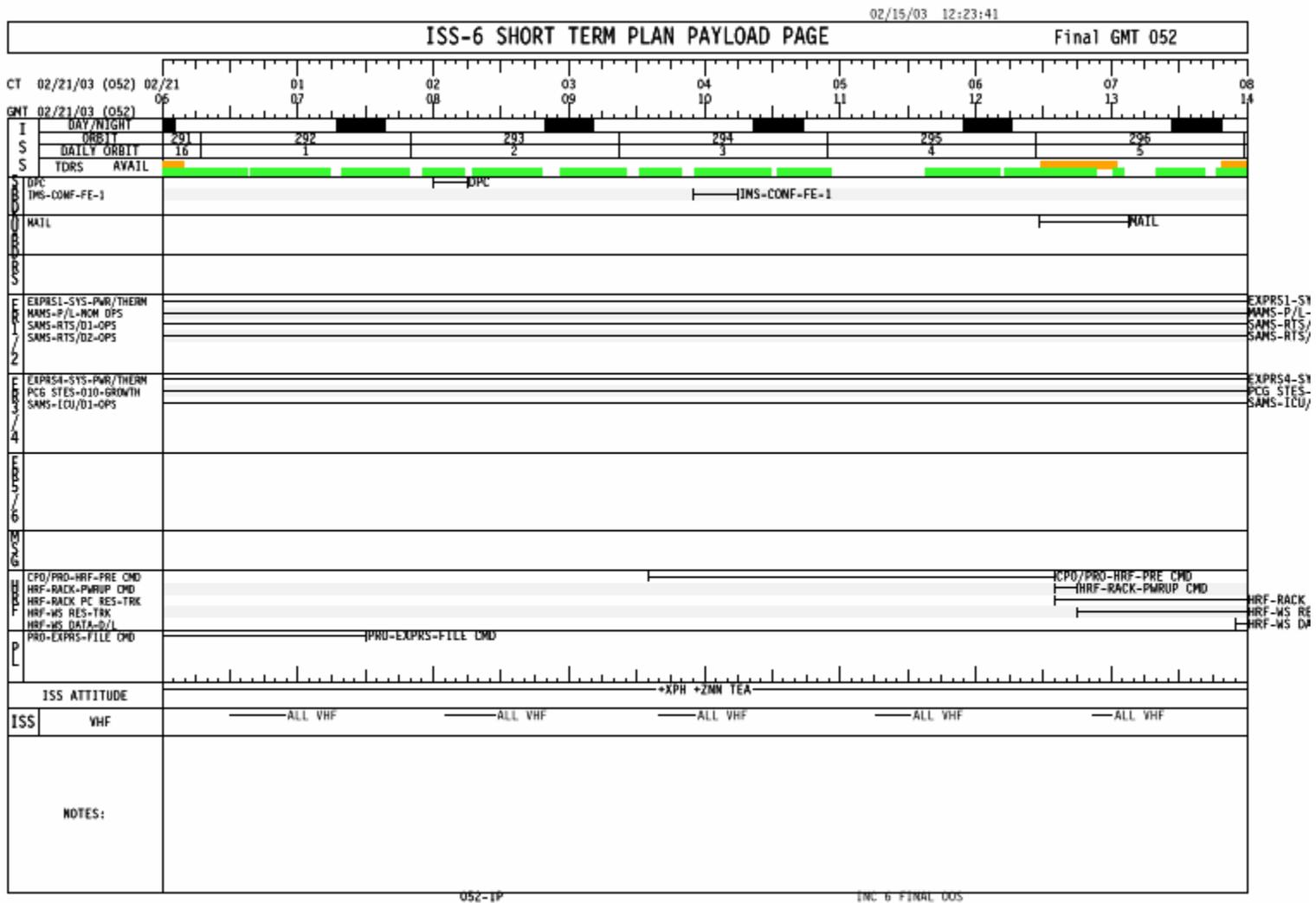
ISS-6 SHORT TERM PLAN CREW+SYS PAGE												Final GMT 052			
CT 02/21/03 (052) 02/21 05												08			
GMT 02/21/03 (052) 06												14			
DAY/NIGHT															
DAILY ORBIT															
TDRS AVAIL															
ISS	ISS CDR	POSTSLEEP	MORNING PREP-WORK	DPC	+	CON-MNT	EXERCISE-TVIS	EXERCISE-RED	MIDDAY-MEAL	FOOT-DATA-XFER					
	FE-1	POSTSLEEP		DPC	Δ			EXERCISE-TVIS	MIDDAY-MEAL	CBO-RCVRY					
	FE-2	POSTSLEEP	MORNING PREP-WORK	DPC	○	*	EXERCISE-RED			MIDDAY-MEAL	*				
C/S	BCC DRY RUN												BCC DRY RUN		
	MCC-H FCT H/O (1/2)												MCC-H FCT		
	DPC												DPC		
	IMS-CONF-FE-1												IMS-CONF-FE-1		
MAIL-SYNC												MAIL-SYNC			
ISS ATTITUDE												+XPH +ZNN TEA			
CEO															
ISS	VHF	ALL VHF			ALL VHF			ALL VHF			ALL VHF			ALL VHF	
	NOTES:	▲HMS-FFQ (CDR)    ○○-CAB-PAN-FOTO-DRWLD    @ARM-CMC-AUDIT    @FOOT-DATA-D/ @MORNING PREP-WORK    ▲@-CAB-PAN-FOTO    *IMS-CONF-FE-1    *EVA-SUIT ▼BMO-5-CK1    *HMS-FFQ (FE2)    *WRN-CMC-FILL    *3K-PANEL-MEASRM ΔC1-CB-P0-RBR    *MSG-FAC-TROUBLESHOOT ○ACS-COMK CO2-READ													

052-1C

INC 6 FINAL DOS



# Typical STP Ground Page



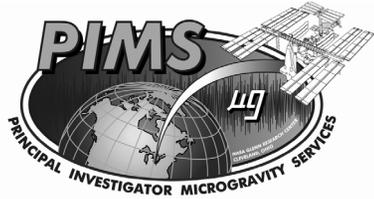


## Increment Planning: Execution



- **Real Time Planning**

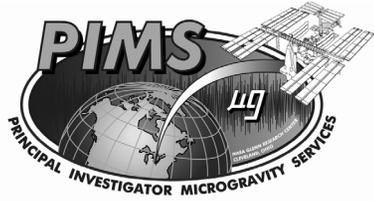
- Planning requirements updates from the Payload Developers/Payload Investigators are submitted via PIMS OCR.
  - PIMS OCRs are transferred to PPCR by MSFC POIC
- On-Board Short Term Plan (OSTP) are developed based on the Final STP and any additional PPCRs
  - Consists of 5 days of operation (E-0 through E-4)
  - Draft composed during Houston Business hours E-5 days (E-1 through E-5)
  - Reviewed by Control Centers during E-5 day
  - Final uplinked to ISS crew prior to Evening Daily Planning Conference (DPC) at @ 19:30 GMT (1:30 PM CST)
  - Any required updates are reviewed and uplinked during crew sleep and are discussed with the crew during the Morning DPC



## ISS Planning and Analysis Tools



- **Consolidated Planning System (CPS) -**
  - Oracle based planning system used to construct WLPs, STPs, and generate OSTPs
  - Uses common export file format to exchange planning information between MCC-H and the other planning centers.
- **On-board Short Term Plan Viewer (OSTPV) -**
  - Hosted on ISS Operational LAN to allow ISS crew direct access to daily plans and hot links to the operational procedures corresponding to activities
  - Used in MCC-H to review the operational plans as well as for execution of ground operations
- **JEDI -**
  - a web utility that provides an integrated capability to generate and manage Station and Shuttle crew messages and execute packages
  - Generates the on-board website updates which allow the crew access to the messages



## ISS Planning and Analysis Tools



- **PPCR -**
  - the standard, web-based change request interface for all ISS Ops Planning products (OOS, WLP, STP, OSTP).
  - Any flight controller or other authorized user (i.e., anyone with access to the MCC-H website) may submit a PPCR
- **Manual Procedure Viewer (MPV) -**
  - a software tool that provides on-line access to electronic documentation with hypermedia capabilities
  - Used on-board and in MCC-H to view procedures
  - linking between OSTP activity and MPV viewer available
  - also allows for links within a procedure to either sub-procedures or references



## Tools available to Payloads



- **interim User Requirements Collection (iURC) –**
  - Collects ISS payload activity information from the users which will then be used to plan and schedule the activities aboard the ISS.
  - An online page with help is available at the following URL: <https://iurc.nexus.nasa.gov/>
- **Payload Information Management System (PIMS)**
  - An EHS subsystem that provides an electronic information management system used by payload users, POIC Cadre and others for increment preparation and planning.
- **Payload Planning System (PPS)**
  - planning tool that provides the interface for users and facilities to schedule activities and required resources associated with their payload
- **Payload Operations & Integration Center (POIC)**
  - An ISS facility that manages on-orbit ISS payloads and payload support systems in coordination with the Mission Control Center in Houston (MCC-H), the distributed International Partner (IP) Payload Control Centers (PCCs), Telescience Support Centers (TSCs), and payload-unique facilities
  - An online page with help is available at the following URL: [https://aristotle.hosc.msfc.nasa.gov/POIC\\_Page/poic.htm](https://aristotle.hosc.msfc.nasa.gov/POIC_Page/poic.htm)



## References



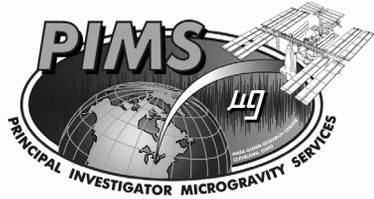
- **Station Program Implementation Plan Volume 1: Station Program Management Plan SSP 50200-01 Revision A February 2001**
- **Station Program Implementation Plan Volume 1: Station Program Management Plan Annex C: Mission Integration and Operations SSP 50200-01-AnxC Revision C May 2002**
- **Station Program Implementation Plan Volume 2: Program Planning and Manifesting SSP 50200-02 Revision B March 2002**
- **Station Program Implementation Plan Volume 4: Payload Engineering Integration SSP 50200-04 Revision B June 2002**
- **ISS Mission Integration Template SSP 50489 Revision A November 2002**
- **ISS Payload Integration Template SSP 57075 Revision A September 2002**
- **Payload Data Sets Blank Book SSP 52000-PDS Revision C August 2001**
- **Standard Payload Integration Agreement for Pressurized Payloads SSP 57059 Baseline August 2001**
- **Payload Integration Agreement Increment Addendum Blank Book for Pressurized Payloads SSP 57060 Baseline August 2001**



## References continued



- **Active Rack Isolation System User's Guide SSP 57006 Revision A  
November 2002**
- **International Standard Payload Rack (ISPR) Structural Integrator's  
Handbook SSP 57007 Revision A October 2001**
- **Pressurized Payload Accommodation Handbook SSP 57020 Revision A  
June 2002**
- **International Space Station Payload Mission Integration Team Execution  
Plan SSP 50471 Baseline April 2000**
- **Execute Planning Control Panel Planning Process Description Document:  
Pre-Increment Execute Planning Process Definition - Generic SSP 50501  
Baseline April 2002**
- **Execute Planning Control Panel Planning Process Description Document:  
Execute Planning Process Definition – Generic SSP 50474 Revision A  
December 2002**



## Contacts



- **Jim Scheib JSC/OZ2 Mission Integration & Planning**
  - (281) 244-7786
  - Email: james.s.scheib@nasa.gov
- **Ben Messina JSC/OZ2 Payload Data Sets Blank Book (SSP 52000-PDS) Manager**
  - (281) 226-4966
  - Email: ben.c.messina@boeing.com
- **Mitch Polt JSC/OZ2 Pressurized PIA Increment Addendum Blank Book (SSP 57060) Manager**
  - (281) 226-4837
  - Email: mitchell.a.polt@boeing.com
- **Lewis Wooten MSFC/Payload Operations Planning**
  - (256) 544-2272
  - Email: Lewis.Wooten-1@msfc.nasa.gov
- **Susan Davis MSFC/ Payload Operations Planning**
  - (256) 544-9580
  - Email: Susan.W.Davis@nasa.gov



## Contacts



- **Gary Rowe MSFC/TBE Payload Operations Planning**
  - (256) 961-1087
  - Email: Gary.Rowe@tbe.com
  
- **Donna Sellers MSFC/POIC New User Contact**
  - (256) 544-6557
  - Email: donna.sellers@msfc.nasa.gov
  
- **Theresa Maxwell MSFC/PPS**
  - (256) 544-2232
  - Email: theresa.maxwell@msfc.nasa.gov
  
- **Chris Traylor MSFC/iURC Accounts**
  - (256) 544-2221
  - Email: Christopher.J.Traylor@nasa.gov
  
- **John Jaap MSFC/iURC Software**
  - (256) 544-2226
  - Email: John.P.Jaap@nasa.gov